REMARKS

I. Introduction

In response to the Office Action dated January 8, 2004, claims 1-11, 22, 23, and 38-54 have been cancelled, claims 12-21 and 24-37 have been amended, and 55-75 have been added. Claims 12-21, 24-37, and 55-75 are in the application. Re-examination and re-consideration of the application, as amended, is requested.

II. Claim Amendments

The Applicant has canceled claims 1-11, 22, 23, and 38-54 with the intent of pursuing similar or modified claims in continuing patent applications. Claims 12-21 and 24-37 have been amended to more clearly recite their inventive application to the problem of compatible transmission to both legacy and non-legacy devices.

III. The Cited References and the Subject Invention

A. The Arslan Reference

U.S. Patent No. 6,574,235, issued June 3, 2003 to Arslan et al. discloses methods of receiving co-channel signals by channel separation and successive cancellation and related receivers. The method allows the reception of a plurality of communications from a respective plurality of transmitters using a common carrier frequency, and includes receiving a plurality of information signals on a common carrier frequency corresponding to the plurality of communications from the plurality of transmitters, and generating first and second separated signals corresponding to respective first and second ones of the information signals so that the first separated signal includes a primary component corresponding to the first information signal and so that the second separated signal includes a primary component corresponding to the second information signal. The first separated signal is demodulated to provide an estimate of a first information sequence corresponding to the first information signal, and the estimate of the first information sequence is modulated to provide a modulated estimate of the first information sequence. The modulated estimate of the first information sequence is subtracted from the second separated signal to provide an improved second separated signal. The improved second separated signal is demodulated to

A

provide an estimate of a second information sequence corresponding to the second information signal. Related receivers are also discussed.

B. The Subject Invention

The present invention provides a system and method for transmitting and receiving signals which are both backwards compatible with existing legacy receivers (and which receive a legacy signal) and forward compatible with non-legacy receivers which receive both the legacy signal and the non-legacy signals.

C. Differences Between the Subject Invention and the Cited References

The Arslan reference is directed to solving the problem of reducing co-channel interference from adjacent cells in a cellular communications systems. As described in the Arslan reference:

> Due to the limited availability of the signal spectrum, cellular radiotelephone systems have been developed wherein carrier frequencies are re-used in distant cells to increase spectral efficiency. Because of this frequency reuse, however, co-channel interference may be present at both mobile terminals and base stations. In response, there have been efforts to develop signal enhancing receivers to reduce the effects of co-channel interference. For example, see the reference by Medepalli et al. entitled "Combined Equalization And CoChannel Interference Cancellation For The Downlink Using Tentative Decisions" (IEEE 1999) the disclosure of which is hereby incorporated herein in its entirety by reference.
>
> The effects of co-channel interference (CCI) can conventionally be reduced by providing signal separation in the transmission of different signals. Cochannel signal separation is conventionally provided in an FDMA system by providing physical separation between two transmitters using the same carrier frequency and between the respective receiving base stations. Accordingly, a first signal is received by the first base station at a significantly higher strength than a second signal, and the second signal is received by the second base station at a significantly higher strength than the first signal. As cell sizes are reduced to provide greater capacity, however, the differences in signal strengths may be reduced making it difficult to receive one or both co-channel signals. Interference from signals transmitted on adjacent carrier frequencies (adjacent channel interference or ACI) can be accommodated by filtering the carrier frequency of interest. Arslan reference, col. 1, lines 14-43.

Arslan solves this problem by separating the two signals to produce separate baseband signals, using a signal separator (41) as shown in FIG. 2:

A

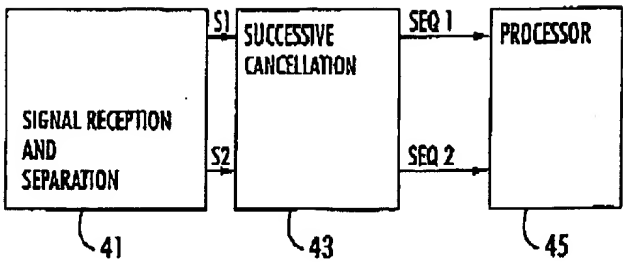

FIG. 2

The separate baseband signals are separated via performing successive cancellation by subtracting a re-encoded and modulated first information sequence from the co-channel baseband signal to produce a second baseband signal, as shown in FIG. 1 below:

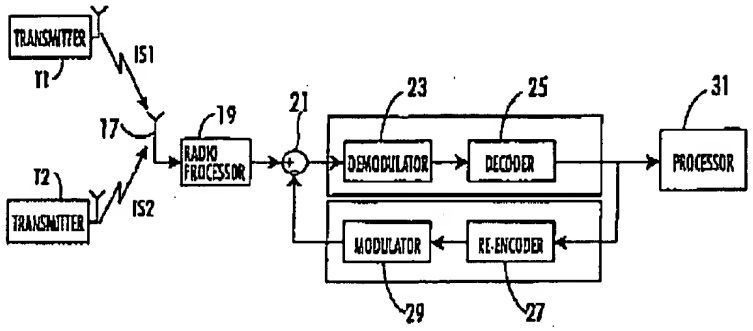

FIG. 1

The Applicant's invention is directed to an entirely different problem ... that of compatibly transmitting additional spectral information to both legacy receivers and non-legacy receivers configured to receive both the legacy signals and the additional spectral content. As described in the Applicants' specification:

> As the various digital signal communication systems and services evolve, there is a burgeoning demand for increased data throughput and added services. However, it is more difficult to implement either improvement in old systems and new services when it is necessary to replace existing legacy hardware, such as transmitters and receivers. New systems and services are advantaged when they can utilize existing legacy hardware. In the realm of wireless communications, this principle is further highlighted by the limited availability of electromagnetic spectrum. Thus, it is not possible (or at least not practical) to merely transmit enhanced or additional data at a new frequency. Specification, page 1.

The prior art teaches that the compatible transmission of legacy signals to legacy receivers and additional information to non-legacy receivers should be accomplished by use of higher-order modulation techniques. As described in the Applicant's specification:

> The conventional method of increasing spectral capacity is to move to a higher-order modulation, such as from quadrature phase shift keying (QPSK) to eight phase shift keying (8PSK) or sixteen quadrature amplitude modulation (16QAM). Unfortunately, QPSK receivers cannot demodulate conventional 8PSK or 16QAM signals. As a result, legacy customers with QPSK receivers must upgrade their receivers in order to continue to receive any signals transmitted with an 8PSK or 16QAM modulation. Specification, page 1.

One example of compatibly increasing spectral capacity by way of higher-order modulation is evidenced by the well known transmission modulation techniques used to transmit both black and white and color television signals. Another, more contemporary example of such techniques is disclosed in U.S. Patents 5,600,672, 5,802,241, and 5,892,879, issued to Oshima, in which compatible satellite constellations are used.

The Applicant's invention solves the compatible data transmission problem using an entirely different technique using layered, non-coherent modulation and demodulation of the transmission signals. While this technique has certain similarities with the methods described in the Arslan reference, nothing in the Arslan reference teaches that non-coherent modulation and demodulation techniques can be applied to the problem of legacy transmission compatibility. The claims have been amended to emphasize this distinction. The Applicant's claims also recite particular structural differences (discussed below) which distinguish them from the Arslan reference.

IV. Office Action Prior Art Rejections

In paragraphs (1)-(2), the Office Action rejected claims 1-54 under 35 U.S.C. § 102(e) as being anticipated by Arslan et al., U.S. Patent No. 6,574,235 B1 (Arslan). With respect to remaining amended claims 12-21, and 24-37, the Applicant respectfully traverses these rejections.

With Respect to Claim 12: Claim 12 recites:

> *A method of transmitting a transmission signal having a legacy upper layer signal receivable by a plurality of legacy receivers and a plurality of layered modulation receivers and a lower layer signal non-coherently layered over the legacy upper layer signal, the lower layer signal receivable by the layered modulation receivers and not receivable by the legacy receivers, the method, comprising:*
>
> *transmitting the legacy upper layer signal including a first carrier and first signal symbols ; and*

A

transmitting a lower layer signal including a second carrier and second signal symbols ;
wherein the layered modulation receivers demodulate the legacy upper layer signal to produce the first signal symbols, remodulate the first signal symbols, and subtract the remodulated first signal symbols from the demodulated legacy upper layer signal to produce the second signal symbols.

As described above, nothing in the Arslan reference teaches compatibly transmitting (1) a legacy upper layer signal receivable by a plurality of legacy receivers and a plurality of layered modulation receivers, and (2) a lower layer signal non-coherently layered over the legacy upper layer signal, so that (3) the lower layer signal is receivable by the layered modulation receivers and not receivable by the legacy receivers. Instead, the Arslan reference teaches a system for reducing interference in a system of receivers of the same generation, and allows all receivers to receive all transmitted signals. Arslan therefore teaches away from the present invention.

Further, as described above, the prior art teaches that backwards-compatible transmissions are implemented via higher order modulation techniques, and therefore teach away from the Applicant's invention.

With Respect to Claims 13-20: Claims 13-20 are rejected based upon "inherent" disclosures in the Arslan reference. The Applicant respectfully traverses these rejections. Inherency "may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient." Continental Can Co. v. Monsanto Co., 948 F.2d 1264, 1269(Fed. Cir. 1991). Instead, to establish inherency, the extrinsic evidence "must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill." Continental Can Co., 948 F.2d at 1268.

Nothing in the Arslan reference requires that the signal layers be QPSK, include a code rate of 6/7, or any of the other features recited in claims 13-20. Accordingly, reliance on the inherency doctrine is misplaced.

With Respect to Claim 21: Claim 21 recites:

A receiver for compatibly receiving a transmission signal having a legacy upper layer signal receivable by a plurality of legacy receivers and a plurality of layered modulation receivers and a lower layer signal non-coherently layered over the legacy upper layer signal, the lower layer signal receivable by the layered modulation receivers and not receivable by the legacy receivers, the receiver comprising:
a first demodulator for demodulating the legacy upper layer signal to produce a demodulated signal;
a first layer decoder, coupled to the first layer demodulator, for decoding the demodulated signal to produce legacy upper layer signal symbols ;

a remodulator, coupled to the first layer decoder, for remodulating the first signal symbols to produce a remodulated legacy upper layer signal;

a subtracter, coupled to the first demodulator and the remodulator, for subtracting the remodulated legacy upper layer signal from the demodulated signal to produce the lower layer signal;

a second layer demodulator, coupled to the subtracter, the second layer demodulator for demodulating the lower layer signal to produce a second demodulator output; and

a second layer decoder, coupled to the second layer demodulator, the second layer decoder for decoding the second layer demodulated output to produce lower layer signal symbols.

Claim 21 recites features similar to those of claim 12, and is patentable on the same basis. Claim 21 also recites additional features that are not disclosed in the Arslan reference. For example, claim 21 recites that the subtracter is coupled to the first layer decoder and the remodulator, and subtracts the remodulated legacy upper layer signal from the *demodulated* signal to produce the lower layer signal. This embodiment is illustrated in FIG. 4A of the Applicant's disclosure:

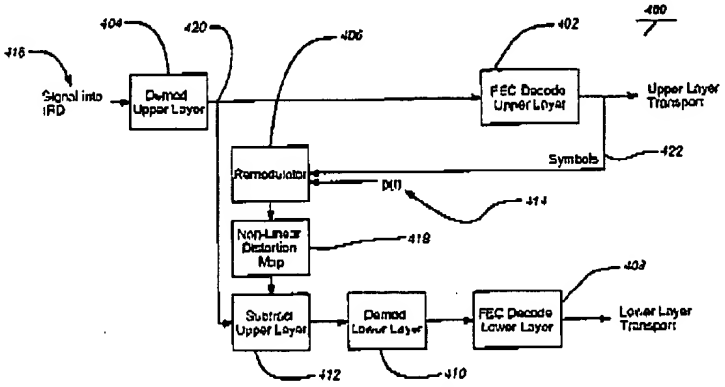

FIG. 4A

Arslan, however, teaches that the signal provided to the subtracter is *not* demodulated. This is shown, for example, in FIG. 4A:

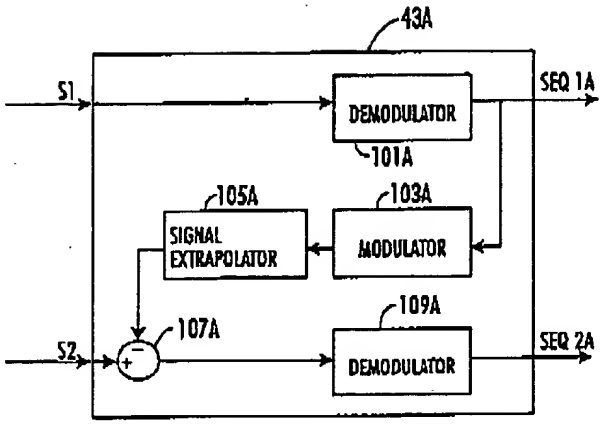

FIG. 4A

With Respect to Claims 24-37: Claims 24-37 are rejected under the inherency doctrine. As described above, reliance on the inherency doctrine is limited to cases where the missing descriptive matter is necessarily present in the subject matter of the reference. Since that is not the case for any of the features recited in claims 24-37, the Applicant respectfully traverses the rejection of claims 24-37.

Claims 24-37 also recite features that are not disclosed or rendered obvious by any of the cited references. For example, nothing in the Arslan even remotely suggests using a non-linear distortion map for removing non-linear distortion effects from the remodulated legacy upper layer signal, or using a legacy upper layer and lower layer signal having offset carrier frequencies. Indeed, Arslan teaches away from these features.

V. Dependent Claims

Dependent claims 13-20 and 24-37 incorporate the limitations of their related independent claims, and are therefore patentable on this basis. In addition, these claims recite novel elements even more remote from the cited references. Accordingly, the Applicant respectfully requests that these claims be allowed as well.

VI. New Claims

New Claims 55-75 are presented for the first time in this Amendment.

With Respect to Claims 55-57: Claims 55-57 recite further features related to the embodiment described in claim 24. None of the references of record disclose estimating a non-

A

linear distortion map from the transmission signal, from the characteristics of the transmitter of the transmission signal, or from transmitter characteristics downloaded to the receiver. Hence, the Applicants believe these claims are allowable over the art of record.

With Respect to Claim 58: Claim 58 recites features analogous to those of claim 12, but from the perspective of the receiver. Since the Arslan reference does not teach the notion of compatible reception of signals in legacy and non-legacy receivers, claim 58 is allowable. Claim 58 further recites the step of subtracting the remodulated legacy upper layer symbols *from the demodulated signal* to produce the lower layer signal. As described above, that feature is not disclosed or suggested by the Arslan reference. Claim 58 is allowable for this reason as well.

With Respect to Claims 59-61: Claim 59 recites the step of removing non-linear distortion effects from the remodulated legacy upper layer symbols before subtracting the remodulated legacy upper layer symbols from the demodulated signal. Nothing in the Arslan reference even remotely suggests this feature. Claims 60 and 61 recite further features likewise not disclosed in Arslan.

With Respect to Claim 63: Claim 63 recites that the legacy upper layer symbols are remodulated according to a pulse shaping filter $p(t)$. This feature is not disclosed or suggested by the Arslan reference.

With Respect to Claims 64-75: Claims 64-75 recite limitations which are similar to those described above and not disclosed or suggested by the Arslan reference. Accordingly, these claims are allowable as well.

A

VII. Conclusion

In view of the above, it is submitted that this application is now in good order for allowance and such allowance is respectfully solicited. Should the Examiner believe minor matters still remain that can be resolved in a telephone interview, the Examiner is urged to call Applicant's undersigned attorney.

Respectfully submitted,

GATES & COOPER LLP

Attorneys for Applicant(s)
6701 Center Drive West, Suite 1050
Los Angeles, CA 90045
(310) 642-4142

Date: April 7, 2004

By: _____
Name: Victor G. Cooper
Reg. No.: 39,641

A